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Saudi society's dietary habits and the use of nutritional supplements during the corona pandemic: A cross-sectional retrospective study

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ABSTRACT

The Coronavirus pandemic is still the deadliest pandemic the world has ever seen. Even though several Coronavirus vaccines, everyone is still searching for other ways to prevent the disease. It is impossible to overestimate the role of good nutrition in maintaining a strong immune system against the virus. This study aimed to see whether people's eating habits changed due to the recent Coronavirus pandemic, and if people understood the importance of a nutritious diet rich in micronutrients for Coronavirus prevention and treatment. A retrospective cross-sectional was used in this study on 468 Saudi Arabian residents. 82.7% of the participants believed that healthy food prevents infection with Coronavirus, 49.1% changed their dietary pattern during the pandemic, and 177 reported their dependence on vegetables and fruits in their diet, 162 honey, 94 black seeds, 92 onions and garlic during the Corona pandemic. 46.7% of them consumed vitamin C, 24.4% vitamin D, 19.6% zinc, and 9.3% multivitamins. 78.5%, of the participants consumed supplements and catch Coronavirus, while who did not consume supplements and were infected with the Coronavirus was 21.5%. The majority of the sample relies on non-medical sources to assess vitamins dosages, and the majorities of them are not using the proper dosages and are unaware that they may cause side effects. Especially during the Corona pandemic and the spread of many incorrect practices, it is advised to educate communities about the importance of a healthy nutritious diet, the benefits and risks of supplements to enable them to only take the recommended doses.

Keywords: Healthy diet, Coronavirus, vitamin C, vitamin D, zinc, supplements.

1. INTRODUCTION

More than a full year after the start of the Coronavirus pandemic, it is still the most dangerous pandemic that the world has faced. Even with the launch of many Coronavirus vaccines, everyone is still looking for alternatives to



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prevent the associated deadly disease. For many reasons, the vaccine may not be the hope, as we face many side effects of vaccines daily, including what causes deaths. Besides, many new strains and mutants of Coronavirus have appeared, for which it is not known to what extent the vaccine can curb infection. Even there are insufficient quantities of vaccines for all the world's population, making developing countries and their inhabitants search for alternatives to prevent other than vaccines (Forni et al., 2021). The importance of good nutrition in maintaining a healthy immune system against the virus cannot be ignored (Aman and Masood, 2020). Immunity triggers and methods of protection against the Coronavirus should prioritize nutrition (Calder, 2020). There is a growing body of evidence in reviews and commentaries on encouraging dietary and natural alternatives for Coronavirus protection and therapy (Ang et al., 2020; Panyod et al., 2020; Silveira et al., 2020; Yang et al., 2020).

Throughout the Coronavirus pandemic, the World Health Organization (WHO) recommends that people consume a well-balanced diet to improve their immune system. This involves fresh vegetables and fruits, legumes, and whole grains. A vegetarian-based diet produces many health advantages for weight, metabolism, and inflammation (Medawar et al., 2019). According to a recent report on Medical News Today, consuming a vegetarian diet may protect the immune system against the risk of Coronavirus infection. Since fruits and vegetables supply many micronutrients (like zinc, selenium, and vitamins A, C, and E), antioxidants, and polyphenols, a diet rich in fruits and vegetables will supply the human body with some of the best natural barriers facing coronavirus (Gasbarre, 2021; Richards, 2021). Homemade plant-based drinks and diets are an essential part of several cultures' traditional medicinal repertoires, which are used to treat mild, contagious, and chronic diseases (Sharifi-Rad et al., 2018; Salehi et al., 2019a; Salehi et al., 2019b).

Virus outbreaks are characterized by high oxidative stress (OXS), which impacts the antioxidant response. During a pandemic, one of the features of viral diseases is the massive development of reactive oxygen species (ROS) in both infected and healthy people (Pisoschi and Pop, 2015; Wang et al., 2020; Trujillo-Mayol et al., 2021). As a result, during viral pandemics, one of the most important goals is to achieve both an oxidative balance and a defensive antioxidant mechanism in order to mitigate the risk of infection or to resolve the infection (Beck and Levander, 1998; Ponton et al., 2011; Sgarbanti et al., 2014). It's uncertain if a healthy diet daily intake of vitamins, minerals, and phytochemicals including phenolic compounds is sufficient during special oxidative stress circumstances including pandemics. A recently published review proposed that antioxidants could have therapeutic potential against Coronavirus. Accordingly, a plant-based diet wealthy in antioxidants and polyphenols may assist guard versus Corona infection (Trujillo-Mayol et al., 2021).

The current study aimed to investigate if people's eating habits shift as a result of the recent Coronavirus pandemic, and if the community understands the value of safe, balanced diet which is rich in vitamins and micronutrients for Coronavirus prevention and treatment.

2. METHODOLOGY

Study design, questionnaire, and population

A retrospective cross-sectional online survey was used in this study. The people who took part in this investigation were Saudi Arabian residents. The research was conducted from October 2020 to April 2021. A Google Form-based questionnaire was prepared in Arabic and distributed to people involved through social networks. There were no advantages for the individuals to engage. Everyone could only send one reply. Even so, some respondents requested the ability to submit several responses because they were also filled out a questionnaire for their elderly family members who were unable to complete the online questionnaires. Replies were double-checked to verify that no replies were duplicated.

There were four types of questions on the survey. The first section includes the participant's basic information, such as citizenship, sex, age, body weight, and length, to calculate body mass index (BMI), educational qualification, chronic diseases, and prior Coronavirus exposure. The second section assesses the participants' food beliefs and their correlation to Coronavirus infection. The third section inquiries the frequency at which the research population consumes different nutritional supplements (vitamin C, D, and zinc) and their beliefs about supplements correlation to Coronavirus infection. The fourth section asks Coronavirus infected participants about the infection wave, cure duration, loss of taste and smell, need for hospitalization, oxygen saturation, body temperature, and difficulty breathing to assess their relationship with nutritional supplements administration. At any point during the analysis, any partner may opt out of the survey. Validity of the survey was checked beforehand. The survey was given to 3 King Abdulaziz University faculty staffs, who were required to rate each item on a 5-point Likert scale ranging from 1 to 4 (1 = very important, 2 = important, 3 = moderately important, and 4 = not important). The item-content validity index (I-CVI) revealed showed an excellent validity (I-CVI=1).

Inclusion criteria

All Saudi residents over the age of 16 were eligible to participate.

Exclusion criteria

Participants who had been vaccinated against Coronavirus with any vaccine up to the time of the study

Sample size

The least number of participants who should involve in this questionnaire was 384 individuals to reach 5% margin of error and 95% confidence limit. The survey was filled by 508 subjects. The total number of members who met the inclusion and exclusion requirements was 468.

Ethics approval

The study design was approved by the Research Ethics Committee, King Abdulaziz University, Kingdom of Saudi Arabia, Reference No" PH-1442-66".

Statistical calculations

The obtained data were subjected to descriptive analysis. Frequency (counts and/or percentages) is used to represent the replies. For data analysis, the chi-squared test was used. Prism® was used to perform statistical analysis on the results (version 8.4.0, GraphPad Software Inc., La Jolla, CA, USA). The significance level was settled as $P \leq 0.05$.

3. RESULTS**The study participants' demographic characteristics and Coronavirus past infection**

This study included 468 participants, most of them were Saudis (89.7%), and the rest were from other nationalities (10.3%). Females represented nearly three-quarters of the study sample (74.8%) and the rest of the males (25.2%). The ages of the participants fell into 6 different age groups as follows: Age group less than 20 years (1.8%), from 20 to 29 years (20.3%), from 30 to 39 years (23.9%), from 40 to 49 years (20.7%), from 50 to 59 years (20.5%), while the age group over 60 years represented 12.8% of the participants. Most of the participants were overweight and obese (32.3% and 36.7%, respectively), while the normal weight participants represented 27.3% of the study sample, and the minority (2.8%) was under weight. Most of the participants were university-educated and postgraduate (master's and doctorate holders) (51.9% and 29.3%, respectively), and the lowest percentage was for those with pre-university education (18.8%). The majorities have chronic diseases (71.2%), and the minority did not suffer from chronic diseases (28.8%). The majority of the sample did not have a history of infection with the Coronavirus (83.1%), while (16.9%) reported a previous infection (Table 1).

Table 1 The study participants' demographic characteristics and Coronavirus past infection

Characteristics	Frequency (n and %)
All Participants (n= 468)	
Citizenship	
Saudi	420 (89.7%)
Non-Saudi	48 (10.3%)
Sex	
Male	118 (25.2%)
Female	350 (74.8%)
Age (Year)	
< 20	8(1.8%)
20-29	95 (20.3%)
30-39	112 (23.9%)
40-49	97 (20.7%)
50-59	96 (20.5%)
> 60	60 (12.8%)
BMI	
Under weight	13 (2.8%)
Normal weight	128 (27.3%)

Overweight	151 (32.3%)
Obesity	176 (37.6%)
Education level	
Pre-university	88 (18.8%)
University	243 (51.9%)
Postgraduate	137 (29.3%)
Chronic diseases	
With	135 (28.8%)
Without	333 (71.2%)
Prior Coronavirus infection	
Yes	79 (16.9%)
No	389 (83.1%)

Data were presented as frequency (number (n) and percentage (%)).

Participants believes about foods and Coronavirus correlation

17.7% of the participants believed that all kinds of food, without exception, prevent infection with the Coronavirus, while 82.3% assert that it is a false belief. In line with that, the prevailing belief (82.7%) was that healthy food prevents infection with Coronavirus, and the minority, 16.2%, believe that food has nothing to do with protection, while 1.1% told that they are not aware of the matter. 49.1% of the population changed their dietary pattern during the Corona pandemic compared to 50.9% who maintained their patterns as before the pandemic. 15.4% of the participants increased the fast-food consumption during the Corona pandemic, versus 84.6% reported no increase. 10.9% of the participants increased the soft drinks consumption during the Corona pandemic, versus 89.1% reported no increase. Furthermore, 3.6% of the participants increased the power drinks consumption during the Corona pandemic, versus 96.4% reported no increase (Table 2).

Table 2 Participants believes about foods and Coronavirus correlation

Participants believes	Frequency (n and %) (n= 468)
Do you belief that all types of food, without exception, helps prevent Coronavirus infection?	
Yes	83 (17.7%)
No	385 (82.3%)
Do you belief that healthy food helps prevent Coronavirus infection?	
Yes	387 (82.7%)
No	76 (16.2%)
Do not know	5 (1.1%)
Do you change your dietary pattern during Coronavirus pandemic?	
Yes	230 (49.1%)
No	238 (50.9%)
Did you eat more fast-food during Coronavirus pandemic?	
Yes	72 (15.4%)
No	396 (84.6%)
Did you consume more soft drinks during Coronavirus pandemic?	
Yes	51 (10.9%)
No	417 (89.1%)
Did you consume more power drinks during Coronavirus pandemic?	
Yes	17 (3.6%)
No	451 (96.4%)

Data were presented as frequency (number (n) and percentage (%)).

Changes in different dietary pattern by the study participants during the Coronavirus pandemic

During the pandemic, 177 participants reported their dependence on vegetables and fruits in their diet, 162 honey, 94 black seeds, 92 onions and garlic, and a few used some other sources. Pre-pandemic, only 88 participants reported their dependence on vegetables and fruits in their diet, 41 honey, 39 black seeds, 50 onions, and garlic, and a few used some other sources (Figure 1).

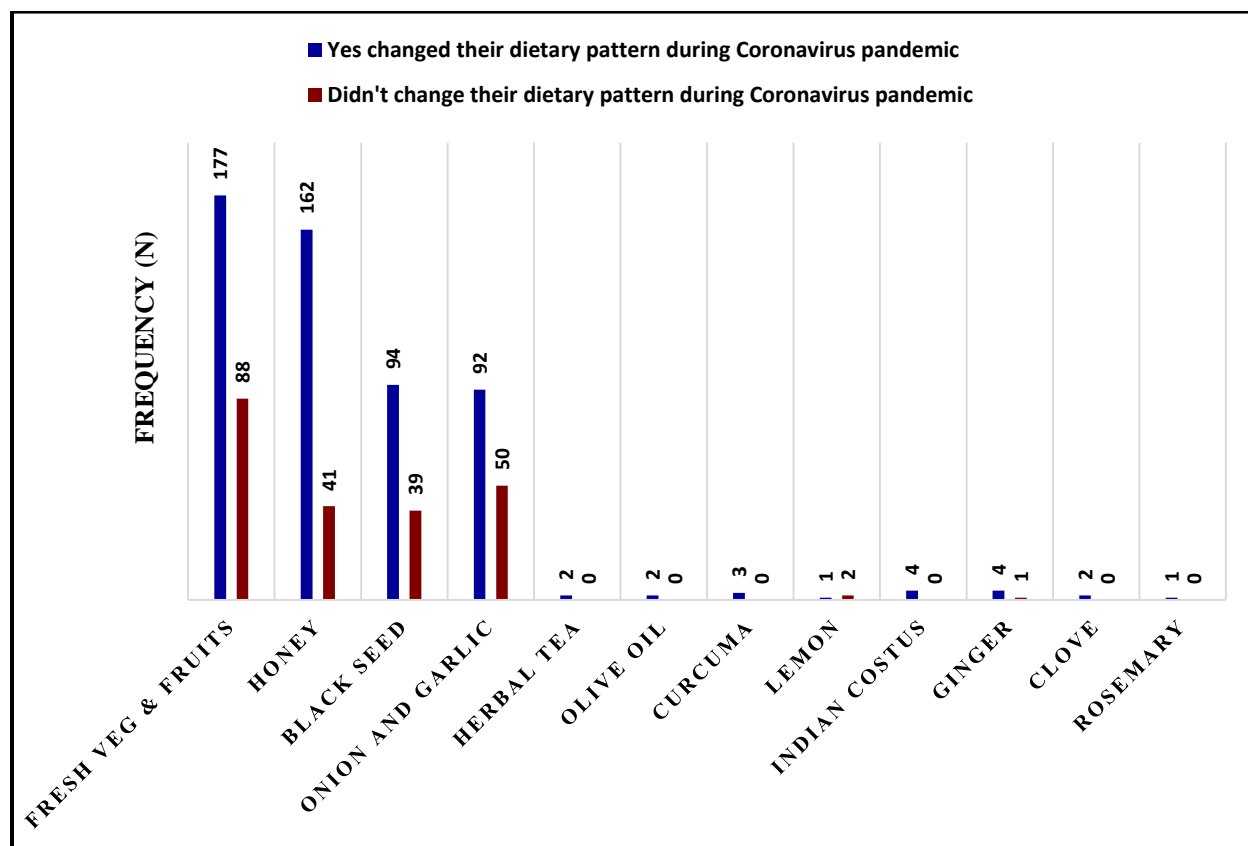


Figure 1 Types and distribution of different foods used by the study participants during the Coronavirus pandemic. Data were presented as frequency (percentage (%)).

Frequency of supplements consumption among study population and correlation with demographic variables

274 (58.5 %) of the study sample reported they received nutritional supplements to avoid infection with the Coronavirus. While 194 (41.5 %) of the participants reported they did not take supplements to protect themselves from infection. The results of the study found that women were the most frequent users of nutritional supplements by 46.2%, compared to 12.4% of men ($P \leq 0.05$). It has also been shown that the age group from 30 to 39 years is the most consuming of nutritional supplements (14.3 %) compared to the rest of the age groups ($P \leq 0.001$). There were no statistically significant relationships between different BMI, education level, and chronic diseases and the use of nutritional supplements to prevent coronavirus infection (Table 3).

Table 3 Frequency of nutritional supplements consumption among study population and correlation with demographic variables

Characteristic	Frequency (n and %) (n= 468)		
Do you administer supplements for the prevention of Coronavirus infection?			
Yes	274 (58.5%)		
No	194 (41.5%)		
Do you administer supplements for the prevention of Coronavirus infection?			
	Yes	No	<i>P</i> Value
Gender			
Male	58 (12.4%)	60 (12.8%)	0.0178*
Female	216 (46.2%)	134 (28.6%)	
Age (Year)			

< 20	6 (1.3%)	2 (0.4%)	0.0008***
20-29	43 (9.2%)	52 (11%)	
30-39	67 (14.3%)	45 (9.6%)	
40-49	41 (8.8%)	56 (12%)	
50-59	65 (13.9%)	31 (6.6%)	
> 60	39 (8.4%)	21 (4.5%)	
BMI (Kg/m ²)			
Under weight	7 (1.5%)	6 (1.3%)	0.8322
Normal weight	78 (16.7%)	50 (10.7%)	
Overweight	90 (19.2%)	61 (13%)	
Obesity	99 (21.2%)	77 (16.4%)	
Education level			
Pre-university	51 (10.9%)	37 (7.9%)	0.4743
University	137 (29.3%)	106 (22.6%)	
Postgraduate	86 (18.4%)	51 (10.9%)	
Chronic diseases			
With	88 (18.8%)	47 (10%)	0.0781
Without	186 (39.8%)	147 (31.4%)	

Data were presented as frequency (number (n) and percentage (%)). Correlation between variables was evaluated using the Chi-square test. *Significant difference at $P \leq 0.05$, and ***Significant difference at $P \leq 0.001$.

Types and distribution of different vitamins and nutritional supplements among study participants, participants who were previously infected with Coronavirus and who did-not

The types of vitamin that the participants in the study relied on were clearly limited to vitamin C and vitamin D, with some also taking zinc as a dietary supplement, and others relying on a multivitamin source to avoid coronavirus infection. According to participants report, 46.7% of them consumed vitamin C, 24.4% vitamin D, 19.6% zinc, and 9.3% multivitamins (Figure 2A). In addition, the percentage of these vitamins and zinc distribution were nearly the same among participants who were previously infected with Coronavirus and who did not (Figure 2B).

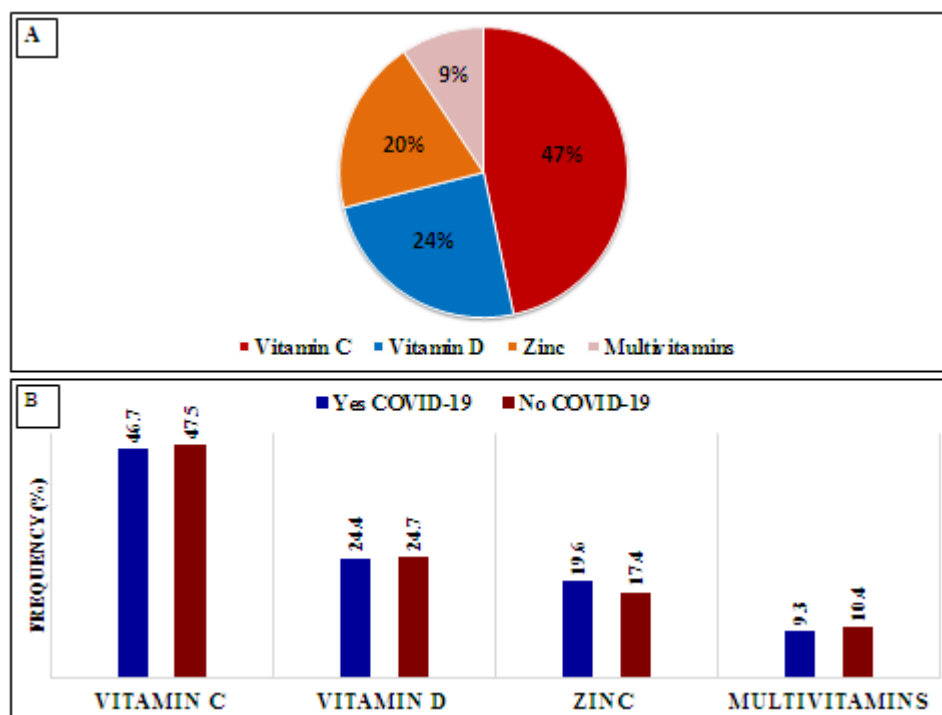


Figure 2 Types and distribution of different vitamins and nutritional supplements among study participants, participants who were previously infected with Coronavirus and who did-not. Data were presented as frequency (percentage (%)).

Correlation between supplements administration and Coronavirus infection wave, cure duration, loss of taste and smell, need for hospitalization, oxygen saturation, body temperature, and difficulty breathing

The percentage of participants who consumed supplements and catch the virus was 78.5% while who did-not consume supplements and were infected with the Coronavirus was 21.5% (Figure 3). People who did-not take supplements and were infected with the Coronavirus in the first wave had a higher rate of infection (17.7%) than those who did-not take them and were infected in the second wave (3.8%) ($P \leq 0.05$). There were no statistically significant relationships between supplements intake and loss of taste and smell need for hospitalization, oxygen saturation, body temperature, and difficulty breathing (Table 4).

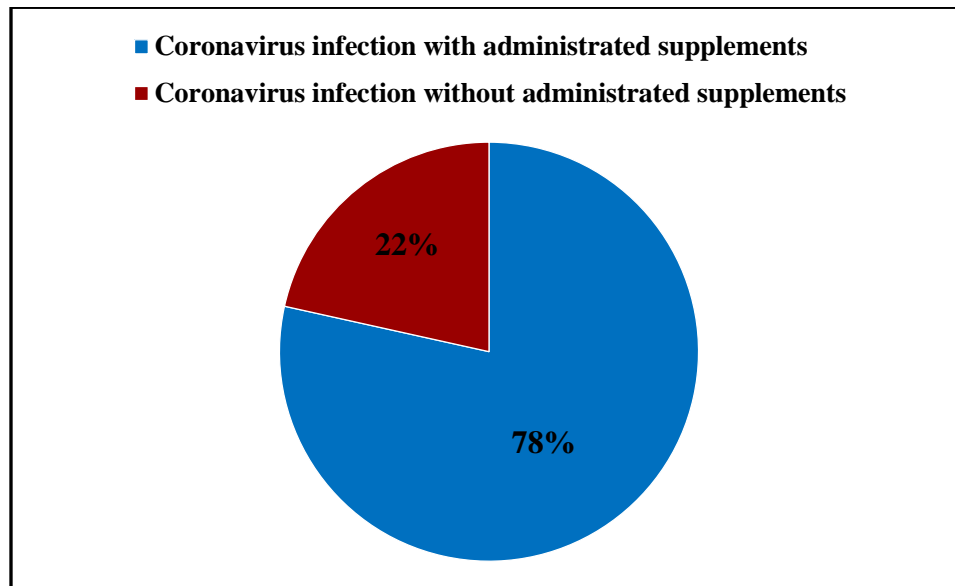


Figure 3 Percentage participants who were infected with Coronavirus with and without supplements consumption. Data were presented as frequency (percentage (%)).

Table 4 Correlation between supplements administration and Corona virus infection wave, cure duration, loss of taste and smell, need for hospitalization, oxygen saturation, body temperature, and difficulty breathing.

Supplements administration			
	Yes	No	<i>P</i> Value
Wave of infection			
1 st Wave	34 (43.1%)	14 (17.7%)	0.0396*
2 nd Wave	28 (35.4%)	3 (3.8%)	
Cure duration			
< One week	7 (8.9%)	3(3.8%)	0.4826
One week	8 (10.1%)	2 (2.5%)	
Two weeks	10 (12.7%)	5 (6.3%)	
Three weeks	19 (24.1%)	2 (2.5%)	
> Three weeks	18 (22.8%)	5 (6.3%)	
Loss of taste and smell			
Yes	40 (50.6%)	12 (15.2%)	0.9315
No	21 (26.6%)	6 (7.6%)	
Need for hospitalization			
Yes	15 (18.9%)	4 (5.1%)	0.9547
No	47 (59.5%)	13 (16.5%)	
Oxygen saturation			
70-	4 (5.1%)	3 (3.8%)	0.3631
80-	4 (5.1%)	2 (2.5%)	

90-	29 (36.7%)	7 (8.9%)	
ND	25 (31.6%)	5 (6.3%)	
Body temperature			
37-	25 (31.6%)	11 (14%)	0.1430
38-	14 (17.7%)	6 (7.6%)	
39-	13 (16.5%)	0 (0.0%)	
40-	8 (10.1%)	2 (2.5%)	
Difficulty breathing			
Yes	15 (18.9%)	3 (3.8%)	0.6666
No	48 (60.8%)	13 (16.5%)	

Data were presented as frequency (number (n) and percentage (%)). Correlation between variables was evaluated using the Chi-square test. *Significant difference at $P \leq 0.05$, and ***Significant difference at $P \leq 0.001$.

Distribution of vitamins and supplements doses, sources, dosing reference, duration of administration, and knowledge about their side effects among the study participants

Concerning vitamin C, 25.5% of the study participants reported taking 50 mg/day, which is less than the recommended daily allowances. 19% of the study population consuming 100 mg/day, which is near the RDAs for both men and women. 0.7% took 500 mg/day, 27% took 1000 mg/day, and 1.8% took the maximum daily safe dose (2000 mg/day). However, 26% of the participants were unaware of their daily dosage (Table 5). Concerning vitamin D, 1.8% of the study participants reported taking less than 600 IU/day, which is less than RDAs. 16.8% of the study population consuming 600IU/day, which equal RDAs for both men and women. 25.9% took 5000IU/week; and 0.8% took 50000IU every 2 weeks. However, 54.7% of the participants were unaware of their daily dosage (Table 5).

Concerning zinc, 15.7 % of the study participants reported taking less than 10 mg/day, which is less than RDAs. 12 % of the study population consuming 10 mg/day, which is near the RDAs for both men and women and 8.4%, took more than 10 mg/day. However, 63.9% of the participants were unaware of their daily dosage (Table 5). Concerning the nutritional supplements sources, 29.7% of the participants depends on medicines, 19.7% on natural products, and 51.1% depends on both. 36.5% of the participants reported that the doctor prescribed the dose of vitamins, 23.4% the pharmacist, 20.4% from social media, and 0.8% from the drug leaflet while 18.9% told other sources (Table 5). 28.1% of the participants consumed nutritional supplements for less than a month, 30.7% for one to three months, 7.7% for three to five months, and 27.7% for more than 5 months. However, 5.8% of the participants were unaware about the duration exactly. 52.2% of the participants were aware that nutritional supplements had side effects, while 47.8% were not aware of it (Table 5).

Table 5 Distribution of vitamins and supplements doses, sources, dosing reference, duration of administration, and knowledge about their side effects among study participants

Characteristic	Frequency (n and %) (n= 274)
Vitamin C dose (mg/day)	
50	70 (25.5%)
100	52 (19.0%)
500	2 (0.7%)
1000	74 (27.0%)
2000	5 (1.8%)
Do not know	71 (26.0%)
Vitamin D dose (IU)	
< 600 /day	5 (1.8%)
600 / day	46 (16.8%)
5000 / week	71 (25.9%)
50000 / 2 weeks	2 (0.8%)
Do not know	150 (54.7%)
Zinc (mg/day)	
< 10	43 (15.7%)

10	33 (12.0%)
> 10	23 (8.4%)
Do not know	175 (63.9%)
Sources of vitamins	
Medicines	80 (29.2%)
Natural sources	54 (19.7%)
Medicines + Natural sources	140 (51.1%)
Dose reference	
By the doctor	100 (36.5%)
By the pharmacist	64 (23.4%)
From social media	56 (20.4%)
From the pamphlet	2 (0.8%)
Other	52 (18.9%)
Duration of supplements administration (month)	
< 1	77 (28.1%)
1-3	84 (30.7%)
3-5	21 (7.7%)
> 5	76 (27.7%)
Other	16 (5.8%)
Does excess supplements have side effects?	
Yes	143 (52.2%)
No	131 (47.8%)

Data were presented as frequency (number (n) and percentage (%)).

4. DISCUSSION

The current COVID-19 pandemic has turned into a global public health issue that has impacted people all over the world. According to the findings of the study, the majority of Saudi society (82.7%) claims that healthy food, not just any food, will protect against Coronavirus infection. During the pandemic, 49.1% of the population changed their dietary habits. Fast food (15.4%), soft drinks (10.9%), and energy drinks (3.6%) were not in high demand. In comparison during and pre- the Corona pandemics, there were increased in the participants dependence on fresh vegetables and fruits (37.8% post-Corona versus 18.8% pre-Corona), honey (34.6% post-Corona versus 8.8% pre-Corona), black seeds (20.1% post-Corona versus 8.3% pre-Corona), onions and garlic (19.7% post-Corona versus 10.7% pre-Corona). Supporting these results, 85.6% of the Saudi population said they ate home-cooked food daily during the Coronavirus pandemic (Alhousseini and Alqahtani, 2020). Another local research found that during the COVID-19 pandemic, more than half of the survey participants raised their fruit intake, and nearly 95% said they consumed home cooked food (Almoraie et al., 2021). Households will benefit from interventions that promote home-cooked meals by incorporating more healthy foods into their meals (Fertig et al., 2019).

An Italian research confirmed reporting a rise in the intake of domestic recipes during the quarantine (Di Renzo et al., 2020). Furthermore, according to another Canadian survey, participants' dietary attitudes have changed after Coronavirus pandemic, since they have cooked more foods at home (Carroll et al., 2020). A study conducted in the West Bank, Palestine, found that 39.5% of participants ate more vegetables during the quarantine period, while 33.2% said they ate more fruit (Allabadi et al., 2020). The previous Saudi study indicated that, in addition to Ramadan fasting, the limited duration of food delivery and closed restaurants during quarantine could be to blame for the decrease in fast-food demand among the Saudi population (Boukhris et al., 2018; Algaissi et al., 2020; Alhousseini and Alqahtani, 2020). However, our research revealed that Saudis believe that eating healthy foods prevents Coronavirus infection, which may be the underlying rationale for avoiding fast food, soft drinks, and energy drinks. According to a recent study, a well-balanced diet is important for the prevention and treatment of viral infections because it can help preserve immunity (Jayawardena et al., 2020).

A vegetarian diet can help to protect the immune system from Coronavirus infection. Fruits and vegetables contain several micronutrients (such as zinc, selenium, and vitamins A, C, and E), antioxidants, and polyphenols, which provide the body with some of the strongest natural barriers against the coronavirus (Gasbarre, 2021; Richards, 2021). Since earlier civilizations, garlic

(*Allium sativum* L.) is one of the most common herbal remedies. Whether combined with honey or not, freshly crushed garlic is thought to boost immunity and have antiviral and other bioactivities, possibly attributed to the prevalence of many biologically active sulfur-containing chemicals as sulfoxide and polyphenols (Sahoo and Banik, 2018; Anywar et al., 2020). Similarly, the findings of a recent local study revealed widespread acceptance of onion and garlic use among the general public, as well as confidence in their ability to boost immunity and reduce the risk of Corona infection (Alyami et al., 2020). Garlic-containing natural products are also widely used by the general public, which is thought to be due to its antioxidant, antibacterial, and anti-inflammatory properties, which help shield people's life (Fredotović and Puizina, 2019). Honey has also been shown to have virucidal properties against many enveloped viruses, including HIV, influenza, herpes simplex, and varicella-zoster virus. Honey can suppress Coronavirus proteases. Methylglyoxal is a part of manuka honey that prevents the growth of enveloped viruses (Watanabe et al., 2014; Hashem, 2020; Hossain et al., 2020). Several studies have shown that Black seed has antiviral, antioxidant, anti-inflammatory, immunomodulatory, bronchodilator, antihistaminic, and antitussive properties that are linked to Coronavirus associated clinical symptoms. To treat Corona infected patients, Black seed may be utilized as an adjunctive therapy alongside other therapy (Maideen, 2020).

The findings revealed that more than half of the study participants (58.5%) take vitamins to avoid corona infection, with the majority of them being women in their 30s and 40s. The use of nutritional supplements was linked to age and gender. The most widely used supplements were C, followed by D and zinc. In comparison to our findings, a study conducted in Saudi Arabia found that only 22.1% of respondents used herbal products or dietary supplements to shield themselves from the Corona outbreak (Alyami et al., 2020). This may be attributed to the fact that their research was done early in the pandemic (May 23rd and June 06th, 2020), while the current study is more than a year after it began (October 2020 to April 2021), as well as the spread of a lot of evidence that supports the use of supplements to boost virus immunity. In line with these findings, a recent local study found that females use supplements at a substantially higher rate than males (Qato et al., 2018). Previous study, on the other hand, found that the use of vitamins and supplements was unaffected by age or gender (Timbo et al., 2006; Block et al., 2007; Fralick and Braun-Trochio, 2019). Owing to its capacity to assist to immune system by promoting both the innate and adaptive immune responses, vitamin C is among the most widely used vitamins among individuals. Vitamin C also aids epithelial barrier function, promotes reactive oxygen scavenging action, and stimulates a variety of protective mechanisms that eventually aid microbes death (Carr and Maggini, 2017). Vitamin D has receptors that are expressed on immune cells. Vitamin D regulates antigen-presenting cells, T-cells, and B-cells. This vitamin also stimulates cathelicidin, a microbicidal component of the innate immune system (Yamshchikov et al., 2009; Prietl et al., 2013). Zinc is a crucial nutrient that plays an important role in anti-inflammatory and antioxidant activities. Zinc is linked to decreased IL-6 and IL-1 β , resulting in a strong anti-inflammatory effect during Corona infection (Pal et al., 2020).

The results showed that the percentage of participants who consumed supplements and were infected with the Coronavirus was higher percentage (78%) than those who did not adopt them and were infected with the virus (22%). A recent study found no protective effects of zinc, garlic, or vitamin C against Corona virus infection, which supports these findings. In their research, however, multivitamins and vitamin D were linked to a lower risk of infection (Louca et al., 2020). Zinc and vitamin C have also been recommended in the past for supporting the immune system and preventing respiratory infections (Wintergerst et al., 2006). However, their effectiveness and evidence base have been challenged, with a meta-analysis of vitamin C showing little protective advantage and a minor decrease in illness length of only about a day (Hemilä and Chalker, 2013; Padhani et al., 2020).

The vitamin doses used in this study may not be adequate for most people, as only about 28% of participants take the prescribed daily vitamin C dose to avoid corona infection, 72% take the right vitamin D dose, and only 20% take zinc in its recommended daily dose. Zinc is a micronutrient that plays an important role guarding against inflammatory and oxidative stress. Just few clinical researches have linked lower serum vitamin levels to an increase risk of Coronavirus infection. In addition, a randomized controlled trial of patients with mild to serious Corona illness who were given a high dose of vitamin D (1000 IU/day) found little advantage. Similarly, a 2021 analysis of zinc (50 mg/day) and vitamin C (8000 mg/day) for patients with moderate Corona infection found no value (Meltzer et al., 2020; Meltzer et al., 2021; Murai et al., 2021; Thomas et al., 2021). While vitamins have not been shown to have a preventive or a therapeutic effect in the treatment of corona, they may be beneficial to the majority of people who have a deficiency.

The majority of the participants got their vitamins dosage details from their doctor or pharmacist, but 40% still depend on unreliable sources. Furthermore, nearly half of the participants in the study were unaware that the vitamins could cause side effects. Vitamin C in large concentrations can cause diarrhea and gastric upset. Higher vitamin C ingestion has also been linked to possible interactions with anticoagulants and antihyperlipidemic action (Says, 2009). Supplementation with large vitamin D doses can cause serious side effects including stomach upset, renal damage, and pancreatitis (Kaur et al., 2015). One must trust the CDC's guidelines over unconfirmed supplements when it comes to avoiding or managing Coronavirus.

5. CONCLUSION

Most of the Saudi society believes in the importance of healthy food during the Corona pandemic, and their diet has also been changed to be more dependent on fresh vegetables and fruits (nearly 50%). 58% of the sample relied on single vitamin or supplements (C, D, and zinc) to prevent corona infection. The nutritional supplements did not show any effect on corona symptoms, especially the dangerous symptoms. It is recommended to inform communities about the benefits and risks of supplements and encourage them to only take the recommended doses from their doctor or pharmacist, particularly during the Corona pandemic and the spread of many incorrect practices.

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Conflict of Interest

The author declares that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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